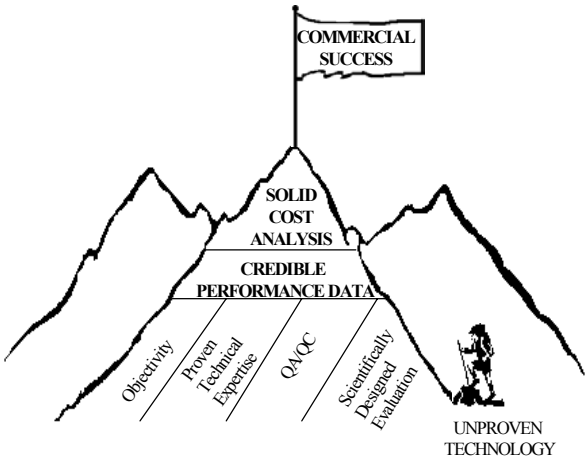
FY 00 Progress and Accomplishments

Demonstration Program

The objective of the Demonstration Program is to conduct field demonstrations and high-quality performance verifications of viable remediation technologies at sites that pose high risks to human health and/or the environment, are common throughout a region or the nation, or where existing remediation methods are inadequate, unsafe, or too costly. The SITE Program solicits applications annually from those responsible for cleanup operations at hazardous waste sites. A panel of SITE Program scientists, engineers, and associated environmental experts reviews the applications to identify those technologies that best represent solutions for the most pressing environmental problems. The resulting data and reports are intended for use by decision-makers in selecting remediation options and for increasing credibility in innovative applications.

Over the past 15 years, SITE has earned increased recognition as a leader in advancing innovative technology development and commercialization and has participated cooperatively with more than 146 technology developers. Through FY 00, the SITE Program has successfully demonstrated 121 technologies, 13 of which were demonstrated during FY 00. These demonstrations have provided a tremendous amount of information on the performance, costs, and applicability of innovative cleanup technologies, which greatly assists managers of environmental remediation projects in developing appropriate and effective cleanup solutions. SITE has been responsive to the user community during this time, and has recently focused on the need for in situ remediation technologies to more cost-effectively remediate sites. As shown in Figure 7, 75 completed SITE projects have been ex situ and 45 in situ. Of the 24 ongoing or demonstrations, 22 are in situ, while 2 are ex situ.



Field demonstration and evaluation of in situ technologies may require several months or years of data collection. This is in contrast to field demonstrations of ex situ technologies where field work can be completed in 1-3 weeks. Based on the SITE Program's increased emphasis on in situ technologies, the number of ongoing demonstrations will likely increase, with fewer moving from ongoing to completed status each year than in the past. It is estimated that six field demonstrations will be completed each year.

During FY 00, 13 new innovative technologies were evaluated in the field. Completed demonstration projects are listed in Table 1, and ongoing projects are provided in Table 2. All completed and ongoing projects in the Demonstration Program, ETP, and MMT

Program are listed in Appendices A and B.

Emerging Technology Program (1987-1995)

Nine solicitations were issued from November 1987 (E01 Solicitation) to July 1995 (E09 Solicitation). A total of 77 technology development projects were initiated under the ETP, and 66 projects were successfully completed during this same period. Eighteen of the former ETP projects entered into the Demonstration Program.

Monitoring and Measurement Technologies Program

The MMT Program has leveraged its resources with EPA's Environmental Technology Verification Program. These two programs, known collectively as the Consortium for Site Characterization Technologies, have developed a partnership with the DOE. Resources from the SITE Program are used solely for those technologies addressing hazardous waste. This partnership will help to address the demands on the MMT Program and reduce the backlog of applications submitted by developers of innovative technologies.

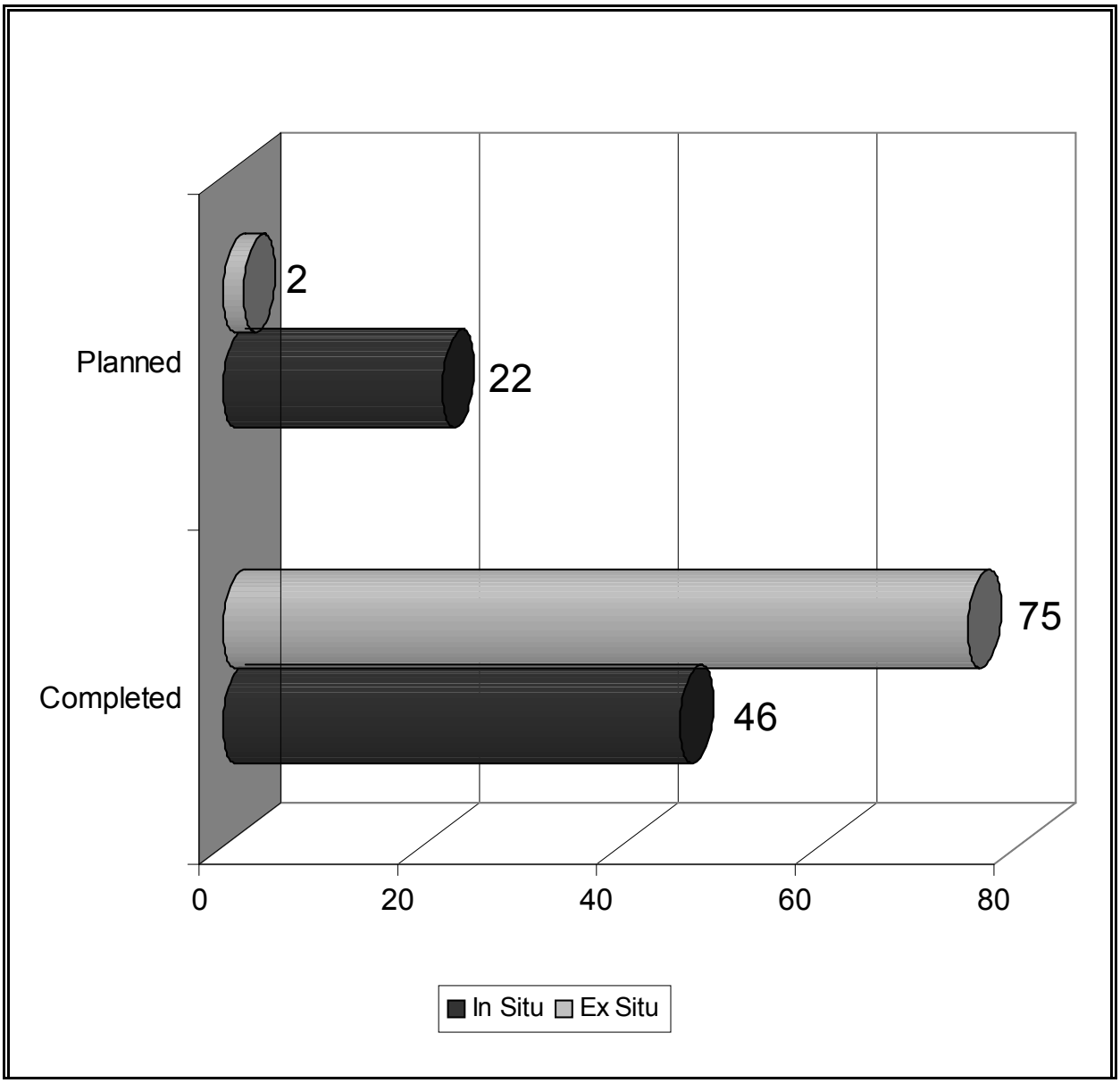


Table 1. SITE Demonstration Project Completed in FY 00			
Developer Location	Developer	Technology	Site Location
WA	CES, Inc.	CES designed and built a Six Phase Heating system to recover TCE and DNAPL. The system used resistive heating to bring the plot to temperature so that the TCE would volatilize and be recovered in vacuum extraction wells. TCE was recovered above ground and shipped off-site for disposal.	Cape Canaveral, FL
NM	Commodore Advanced Sciences, Inc.	Solvated Electron Technology (SET) remediation system chemically reduces toxic contaminants. The solvating system uses a solution of ammonia and an "active" metal to create a powerful reducing agent that can clean up contaminated soils, sediments and liquids.	Pearl Harbor, HI
MA	Earthsoft, Inc.	This project involved the evaluation of EQuIS Environmental Quality Information Systems. EQuIS provides mechanism to manage chemical and geological data, modules to check electronic data deliverables, and to partially validate chemical and GIS data.	Trenton, NJ
CA	Eco Mat, Inc.	This technology uses denitrifying bacteria to convert nitrogen compounds to harmless byproducts. The process uses common bacteria that live on a sponge-like medium inside a reactor. The reactor circulates these materials with contaminated water to enhance biodegradation rates.	Bendena, KS
NJ	Envirogen, Inc.	The Envirogen demonstration involves the use of a solvent extraction and bioremediation for PCBs at the Lower Colorado River Authority Electrical Substation.	Goldthwaite, TX
Ontario, Canada	EnviroMetal Technologies, Inc.	The In Situ Reactive Barrier uses zero-valent iron to reduce oxidized metals and to induce reductive dechlorination of chlorinated VOCs. In addition, this technology can immobilize some metals by reduction and sorption.	Rocky Flats, CO
CA	Geokinetics International, Inc.	This thermal technology applies AC current to the soil matrix in order to produce heat. This process reduces LNAPL viscosity, causes DNAPL to float to the top of the saturated zone, reduces the size of the smear zone, and can increase the biological activity in the heated zone.	Pearl Harbor, HI
VT	Green Mountain Laboratories	This technology applies enhanced biodegradation of PCBs in contaminated soil at the Beede Waste Oil Site.*	Plaistow, NH
ID	Idaho National Environment and Engineering Laboratory	Surfactant-enhanced aquifer remediation at neutral buoyancy allows for increased solubilization of DNAPLs to allow for removal from the subsurface. The technology incorporates a cosolvent to provide neutral buoyancy of treatment water to provide vertical migration of contamination in the subsurface.	Milford, NH
FL	IT Corporation	IT designed and operated a system to inject potassium permanganate below ground into a zone contaminated with TCE and DNAPL at Kennedy Space Center, FL. The system will inject the oxidant throughout a 50 by 75 foot plot down 46 feet to the aquitard. KMNO4 oxidized the contaminants toform benign byproducts carbon dioxide, manganese dioxide, potassium ions, chloride ions and hydrogen ions.	Cape Canaveral, FL

Table 1. SITE Demonstration Project Completed in FY 00 (continued)			
Developer Location	Developer	Technology	Site Location
CO	Pintail Systems, Inc.	This technology involves growing and augmenting indigenous bacteria in culture to reduce the leaching of lead at contaminated sites. The cultures are grown in a laboratory setting, and applied in situ to biostabilize lead contamination in soil.	Crooksville, OH; Aurora, CO
CO	Pintail Systems, Inc.	Isolated indigenous organisms capable of remineralizing arsenic are grown and augmented in lab cultures.	Jackson, CA; Aurora, CO
IN	Sevenson Environmental Services, Inc.	The MAECTITE® chemical treatment process can be applied to soils, waste and other materials containing lead and other heavy metals. The technology uses reagents and processing equipment to stimulate the nucleation of crystals by chemical bonding.	Sparta, WI

*A treatability study was performed, a full demonstration project was not completed..

Table 2. SITE Demonstration Ongoing Projects in FY 00			
Developer Location	Developer	Technology	Site Location
IL	Argonne National Laboratory East	This project involved the phytoremediation of radionuclides and solvents. Specifically, trees were utilized to degrade organic contaminants or to draw tritium out of the groundwater flow.	ANL-E Argonne National Lab-East
SC WA	E&C Williams Keeco	This project involved chemical stabilization of mercury mining wastes. Large scale column leaching tests were conducted in cooperation with EPA's Mine Waste Technology Program. Several vendor treatments to stabilize Hg in-situ were evaluated including the use of silicates, sulfides, and phosphates.	Butte, MT*
LA	Electrokinetics, Inc.	Electrokinetic's soil process extracts and remediates heavy metal or organic contamination in soils. Electrodes are placed in situ, and a current is applied to mobilize ions and remove contamination.	Fort Polk, LA
CA	Geokinetics International, Inc.	Geokinetics has constructed a closed loop lead recovery process to treat contaminated soil from a battery shop. Soil is excavated and stored in storage containers on-site. An electrolyte solution (EDTA) is passed through the soil. The lead/EDTA solution will then be processed using the electrochemical lead recovery system, where the lead will be recovered as lead plate and the EDTA reused.	Pearl Harbor, HI
MA	Harding-Lawson Engineers	In Situ anerobic-aerotic bioremediation of chlorinated solvents. Hydrogen Release Compound (HRC) diffuses into groundwater passing through passive treatment wall. This acts as a base and cometabolite for bioremdiation.	Grafton, MA
CA	Integrated Water Resources, Inc.	IWR has designed a steam heating with co-air injection system for the stripping and recovery of TCE and DNAPL. The system will inject steam and air to strip the TCE. The TCE will not condense at the steam front as the plot is heated. The steaming will strip the TCE and the Vapor Recovery wells will collect the steam and TCE for separation and off-site disposal.	Cape Canaveral, FL
TX CA	Micro-Bac International, Inc. X-19 Biological Products, Inc.	This project involves the combination of two process (Micro-Bac and X-19) for the biological treatment of PCBs. Products are mixed with the contaminated soil to promote a reduction in PCB concentrations.	Goldwaithe, TX
WI	Minergy	This project involves utilizing a glass furnace to melt dried river sediment contaminated with PCBs. The glass furnace temperature is expected to destroy the organic compounds and to form a glass aggregate product that has beneficial reuse properties.	Fox River, WI
CA	Regenesis	In Situ anerobic-aerotic bioremediation of chlorinated solvents, pesticides, and other contaminants. Hydrogen Release Compound (HRC) diffuses into groundwater passing through passive treatment wall. This acts as a base and cometabolite for bioremdiation.	Rocky Mountain Arsenal, CO

Table 2. SITE Demonstration Ongoing Projects in FY 00 (continued)			
Developer Location	Developer	Technology	Site Location
CO	Region 8 and State of Colorado	This project involved multiple innovative passive and semi passive mine drainage technologies. Technologies evaluated included the Aquafix lime despensing water wheel with retention in settling tanks, an oxidation pond, a SAPS system, and a limestone lined channel.	Summitville, CO
MA	Terra Therm LLC	This in-situ technology utilizes conductive heating from heater wells to volatilize organic contaminants in the soil. The contaminants are then removed with heater/vacuum wells.	Rocky Mountain Arsenal, CO
OH	U.S. EPA, NRMRL	Alternate Cover Assessment Program (ACAP) - The ACAP is a cooperative partnership of industry, government, and research institutions that will evaluate evapotranspiration and break cover systems. The program is expected to provide cost-effective alternative cover designs, and assist in the development of designs at other sites.	12 sites around the nation
WA	Wilder Construction Co.	MatCon is a modified asphalt system for primary use as an exposed hydraulic containment cover system. When combined with selected aggregates the material can be used as a barrier layer or as a drainage layer. Together, the material can form a multilayer drained cap atop landfills or contaminated soils.	Dover, DE and Elgin, IL

* Column and humidity cell tests on waste from sulphur bank mercury mine located in Clear Lake, CA.

To further advance the MMT Program, a stakeholder group was formed to assist in outreach activities and in the selection of technologies. An advocates program involving the EPA Regional offices was also established to assist in the MMT demonstration process and to ensure that the products of the demonstrations address issues relevant to EPA.

Demonstrations in FY 00

During FY 00, field demonstrations were completed on seven total petroleum hydrocarbon (TPH) measurement technologies (Table 3). The technologies were tested by analyzing TPH-contaminated soil samples collected from five areas located in three regions of the United States.

Ongoing Demonstrations

The MMT Program has identified a number of possible candidate technologies for demonstration in FY01. One category of technology is field portable X-ray fluorescence spectrometry for the detection of metals in soil. Metals contamination in soil continues to be an important environmental concern at many Superfund sites. This technology category was originally demonstrated under the SITE Program in 1994. Most of the XRF technologies have evolved well past their performance capabilities demonstrated in mid-1990. A few of the companies and their products are no longer in existence and there are a couple of new entries in the market. There is also a continuing interest in the detection and measurement of dense, non-aquenous phase liquids (DNAPLs) in the subsurface.

Geophysical techniques, such as ground-penetrating radar (GPR), have the potential for use as a non-invasive, remote detection method.

Table 3. SITE MMT Program Demonstrations Completed in FY 00

Developer Location	Developer	Technology	Site Location
CA	CHEMetrics, Inc., and AZUR Environmental Ltd.	RemediAid™ Total Petroleum Hydrocarbon Starter Kit developed by CHEMetrics and AZUR in conjunction with Shell Research Lt. is based on a combination of the modified Friedel-Crafts alkylation reaction and colorimetry for measuring total petroleum hydrocarbons in soil.	Port Hueneme, CA
CT	Dexsil Corporation	PetroFLAG™ Hydrocarbon Test Kit for Soil is manufactured by Dexsil® Corporation and is based on emulsion turbidimetry. The kit uses a proprietary, nonpolar organic solvent mixture that is composed of alcohols, primarily methanol, for extraction of petroleum hydrocarbons from soil samples.	Port Hueneme, CA
TN	Environmental Systems Corporation	Synchronous Scanning Luminoscope developed by Environmental Systems Corporation is based on ultraviolet fluorescence spectroscopy. The Luminoscope uses a xenon lamp to produce a multiwavelength ultraviolet light beam that passes through an excitation monochromator before irradiating the soil sample extract held in a quartz cuvette.	Port Hueneme, CA
CA	Horiba Instruments, Inc.	OCMA-350 Oil Content Analyzer developed by Horiba Instruments, Inc. is based on infrared analysis using a single-beam, fixed-wavelength, NDIR filter-based spectrophotometer for measuring total petroleum hydrocarbons in soil.	Port Hueneme, CA
NH	SiteLAB Corporation	SiteLab ® Analytical Test Kit UVF-3100A is based on ultraviolet fluorescence spectroscopy. The UVF-3100A includes a portable fluorometer fitted with excitation and emission filters that are appropriate for TPH analysis of soil samples.	Port Hueneme, CA
DE	Strategic Diagnostics, Inc.	EnSys Petro Test System is manufactured by Strategic Diagnostics Inc. and is based on a combination of immunoassay (specifically enzyme-linked immunosorbent assay) and colorimetry. The device uses methanol for extraction of petroleum hydrocarbons from soil samples.	Port Hueneme, CA
CT	Wilks Enterprise, Inc.	Infracal® TOG/TPH Analyzer, Models CVH and HATR-T developed by Wilks Enterprise, Inc. includes a single-beam, fixed-wavelength, NDIR filter-based spectrophotometer with a dual detector system for measuring total petroleum hydrocarbons in soil.	Port Hueneme, CA

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